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CHAPTER 1

INTRODUCTION

1.1 GENERAL

Approximately one-third of the total land area of the United States is owned or controlled by the Federal Government. One of the world's largest highway networks has been constructed to serve these Federal lands.

Several Federal agencies are responsible for managing public lands and consequently are also responsible for managing a part of this vast network of Federal roads. The role of the Federal Highway Administration (FHWA) and Federal Lands Highway in designing and constructing highway facilities on Federal lands is well defined in existing legislation and supplemental national interagency agreements (see [Section 1.3](#)).

The Office of Federal Lands Highway is headquartered at FHWA in Washington D.C. and also maintains three Federal Lands Highway (FLH) Division offices. See [Exhibit 1.1-A](#) for a geographical breakdown of FLH Division offices. For more than 100 years, FLH and its predecessor offices have offered their expertise to other Government agencies for the planning, location, design and construction of highways, parkways, roads and trails in the Federal domain. Many foreign countries have also been assisted in the development and construction of road systems. See the [FLH website](#) for more information on the FLH program.

One primary goal of the FLH program is to provide safe, cost-effective and environmentally sound highways and roads to serve our nation's Federal Lands. FLH uses context sensitive solutions (CSS) and sound engineering practice to achieve this goal. This requires a collaborative, interdisciplinary approach to roadway planning, design and construction, involving all partners, stakeholders and the public to ensure that transportation projects are in harmony with communities and that they preserve environmental, scenic, aesthetic and historic resources. The effective application of CSS techniques when using the *PDDM* achieves these goals while providing safe and efficient access to our nation's Federal lands.

This *Manual* has been developed to provide information and guidance to internal FLH employees, our partner and stakeholder agencies and our consultants involved with project development and design of highways. It is a key reference tool that is useful to both the veteran manager and the entry-level designer. Its use requires an interdisciplinary team approach. Users of this edition of the *PDDM* will find links between the *Manual's* chapters that will allow them to be aware of related information in chapters other than those of their own discipline. Additionally, the *PDDM* serves as a portal for numerous external technical manuals and reports through the use of links to other websites.

The *Manual* identifies those policies, standard practices, criteria, guidance and references approved for use in carrying out the highway and bridge design responsibilities in the Federal Lands Highway Programs (FLHP). In this regard, the following definitions will be used:

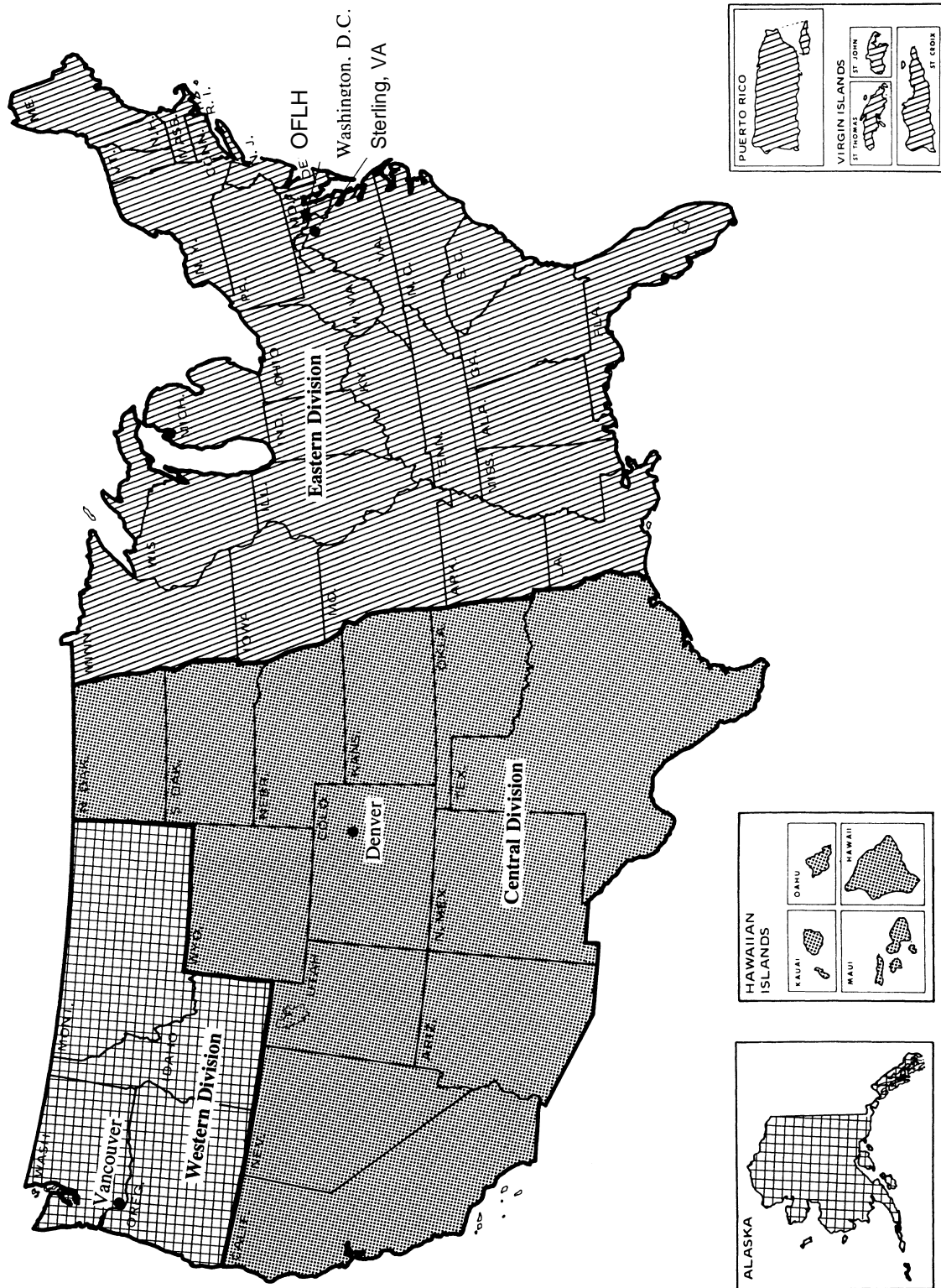


Exhibit 1.1-A FLH DIVISION OFFICES

1. **Policy.** Guiding principle; general course of action to be followed without exception. Where policy is cited the source of the policy is also referenced; when applicable and appropriate. Policy statements are presented in **bold** type.
2. **Standard Practices.** A fixed reference to guide the work. Variance requires written justification. FLH *Standard Practices* are fixed references that the Office of Federal Lands Highway impose to guide both the approach and content of FLH products. Variances to standards and FLH *Standard Practices* are not uncommon, but they need always be justified, and attention to this and guidance on how to do it are included in this *Manual*.
3. **Criteria.** Tests or indicators, in addition to standards, used to measure/judge achievement of applicable policy or standard objectives. Criteria may vary from project-to-project. The *PDDM* provides typical criteria, with guidance on how to select criteria for specific project types and/or conditions.
4. **Guidance.** Suggested actions to meet policies and standards, and expectations for applying discretion. Considerations for selecting appropriate standards and design criteria are included in the *Manual*.
5. **Discretion.** Where the practitioner is expected to exercise engineering judgment to apply an optimum technique, solution or numeric value that is within an acceptable range of values.

Policies, standards and criteria are condensed and written for the user. Where appropriate, relevant procedures, instructional aids and publications are referenced. References to specific computer programs, AASHTO guidelines, manuals and regulations are included in this *Manual*. It is expected that the user will be knowledgeable in the use of the referenced items. This *Manual* does not detail technical methods or procedures. Users are expected to consult the documents referenced for such purposes, and otherwise stay informed of current technologies.

Compliance with all policies and standards in this *Manual* is essential to ensure consistency in project development throughout FLH. Although policy cannot be compromised, flexibility of standards is sometimes necessary to meet project specific objectives. Deviation from standards cited within this *Manual* will require formal justification and approval. Division variances in standards, criteria and guidance are typically found in the Division Supplements at the end of the various chapters.

1.1.1 FORMAT

This *Manual* is divided into thirteen chapters, each dealing with a major category of project development work. See [Exhibit 1.1-B](#) for a diagram of the project development work process. Each chapter has its own table of contents and is subdivided into sections. Policy and criteria are presented in each chapter as they relate to the specific subject matter. The last section in each chapter has been reserved for each Division's supplements. Electronic links are provided for Division Supplements.

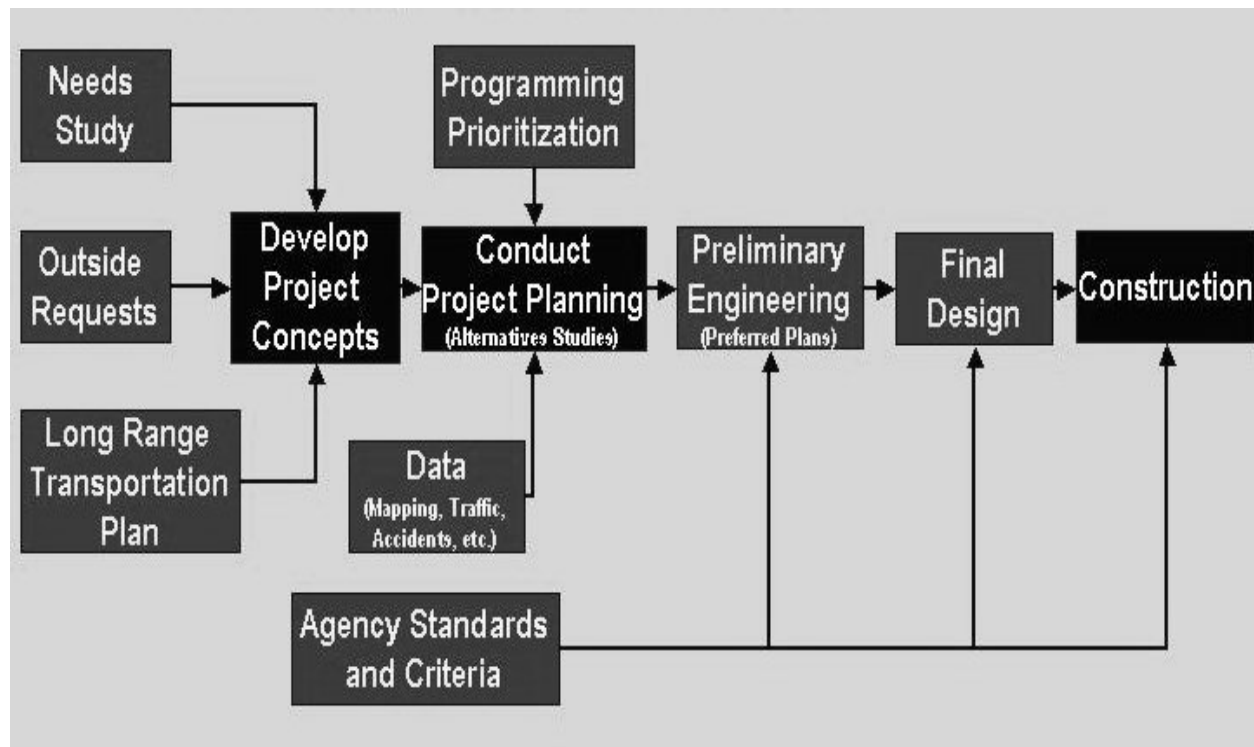


Exhibit 1.1-B PROJECT DEVELOPMENT WORK PROCESS

The format for the main table of contents is in HTML. The remainder of the *Manual* is in Adobe Acrobat Reader PDF format. PDF allows for a more consistent document that can incorporate links, colors, bookmarks and specifications guided by Section 508 of the ADA. The downloaded electronic version of the *PDDM* and its revisions will be considered the official document in contracts with A/E consultants. The *Manual* can be downloaded from the FLH website in its entirety or by individual chapter.

The *Manual* is published in SI (metric) units followed by US Customary (English) units. All design work is to be produced in dual units or as specified by the partner agency. The decision on which units to use will be project specific and determined at the time the project is programmed.

1.1.2 REVISIONS AND UPDATES

The FLH Functional Discipline Leaders (FDL's) are responsible for maintaining the *Manual* and its contents. WFLHD will maintain the electronic version of the *Manual* on their website. Periodically, chapters will be reviewed for adequacy and need for revision. As changes in policies, standards and/or criteria occur, updates will be made electronically. Upon the recommendation of the appropriate FDL, the FLH Directors will approve all revisions and updates on behalf of FLH.

When revisions are available, the user can find a summary via a "Revisions" file on the FLH website at the location where the *Manual* may be viewed and/or downloaded. All revised material will typically be shaded. The shaded material within any given chapter will remain shaded until the next revision, at which time all previous shading in that chapter will be

removed. The FDL's and their respective teams to ensure they are still accurate will check all external links on an annual basis. Internal links will be checked when there is a significant addition or deletion (i.e., new page, deleted section) from the *Manual*. The *Manual* will have either a publication date or revision date on each page to allow the user to determine if they are using the most recent document.

Each user of the *Manual* can contribute to its continuing improvement and is encouraged to submit suggestions to make it more useful and practical. Suggestions can be sent to the appropriate FDL or to ProjDev@mail.wfl.fhwa.dot.gov.

1.1.3 DIVISION SUPPLEMENTS

Supplements added to the section that is reserved for Federal Lands Highway Division office supplemental standard practices, guidance and criteria, will be issued by the appropriate office in a compatible format to this *Manual*. The electronic versions will be identified by Division's reference at the bottom of each page as noted below:

- Eastern Federal Lands Highway Division, (EFLHD),
- Central Federal Lands Highway Division, (CFLHD), and
- Western Federal Lands Highway Division, (WFLHD).

Informational electronic copies of Division Supplements should be distributed to the other Division offices and appropriate FDL's on a routine basis upon issuance.

1.2 GUIDANCE AND REFERENCES

The *Manual* supplements Federal laws and regulations relative to the development and design of highways. It is intended to be used in conjunction with current engineering practices and procedures issued by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), State highway agencies, Federal land management agencies and other select organizations. Applicable laws are set forth in Title 23, [United States Code \(USC\)](#) “Highways.” The governing regulations are found in Title 23, [Code of Federal Regulations \(CFR\)](#). As described below, additional guidance on applicable policy and standards may be found in the *Federal-aid Program Guide*, the *Federal Lands Highway Manual*, national and project interagency agreements and AASHTO or other recognized publications.

1.2.1 CODE OF FEDERAL REGULATIONS ([CFR](#))

The *Code of Federal Regulations* is a codification of the general and permanent rules published in the *Federal Register* by agencies of the Federal Government. The code is divided into 50 titles representing broad areas of Federal regulations. Title 23 [CFR](#) “Highways” is the volume representing those current regulations applicable to FHWA and the FLH Program. The following are the parts of 23 [CFR](#) that are most relevant to the development and design of highways:

- Part 620, Subpart A. *Highway Improvements in the Vicinity of Airports.*
- Part 625, *Design Standards for Highways.*
- Part 626, *Pavement Policy.*
- Part 627, *Value Engineering.*
- Part 630, *Preconstruction Procedures.*
- Part 636, *Design-Build Contracting.*
- Part 650, *Bridges, Structures and Hydraulics.*
- Part 652, *Pedestrian and Bicycle Accommodations and Projects.*
- Part 655, *Traffic Operations.*
- Part 660, *Special Programs (Direct Federal) Forest Highways and Defense Access Roads.*
- Part 668, Subpart B, *Emergency Relief Program Procedures for Federal Agencies for Federal Roads.*
- Part 752, *Landscape and Roadside Development.*
- Part 771, *Environmental Impact and Related Procedures.*

- Part 772, *Procedures for Abatement of Highway Traffic and Construction Noise*.
- Part 777, *Mitigation of Impacts to Wetlands and Natural Habitat*.
- Subchapter L, *Federal Lands Highways*.

1.2.2 **FEDERAL-AID PROGRAM GUIDE ([FAPG](#))**

The *FAPG* consists of two volumes containing FHWA's current policies, procedures, standards and guides relating to the Federal-aid Highway program. The *Manual* also contains program directives relative to administration of the Federal Lands Highway Program (FLHP). An electronic version of the [FAPG](#) as well as FHWA directives and policy memorandums are available on the Department's website.

1.2.3 **FEDERAL LANDS HIGHWAY MANUAL ([FLHM](#))**

The *Manual* is a one-volume book of documents developed by the Office of Federal Lands Highway to consolidate all basic policies, directives, standards, and guides pertaining to the Federal Lands Highway operations into a single resource publication for ease of use and reference.

1.2.4 **NATIONAL INTERAGENCY AND PROJECT AGREEMENTS**

Agency agreements are required whenever FHWA performs work for another agency or when work is performed by another agency with funds administered by FHWA. National agreements have been executed between FHWA and principal Federal land management agencies (i.e., National Park Service (NPS), Forest Service (FS), Bureau of Indian Affairs (BIA), Fish and Wildlife Service (FWS)). Project agreements are executed between Division offices and another agency to detail project specifics that cannot be covered by a national agreement (e.g., project funding, length, geometrics, right-of-way acquisition, utility relocation, construction and maintenance responsibilities). Agreements are discussed in [Chapter 2](#).

1.2.5 **AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) POLICY AND GUIDES**

AASHTO was organized in 1914 and is composed of representatives from all 50 State highway transportation agencies, the Commonwealth of Puerto Rico and the Northern Mariana Islands, the District of Columbia, six Canadian Provinces and two Territories and the Federal Highway Administration.

The organization brought together Federal, State and other highway engineers for discussion of problems, planning of concerted action and adoption of uniform practices. Its avowed objective is to foster the development, operation and maintenance of a nationwide integrated system of highways to adequately serve the transportation needs of our country.

AASHTO publishes recommended specifications, guides and standards on highway design and construction that generally prescribe good practices or criteria considered adequate to provide safe and cost-effective highway facilities. These approved standards and guides as listed herein may be used in conjunction with this *Manual*. Design standards for highways are listed in 23 [CFR](#) Part 625.

AASHTO publications may be purchased [online](#).

1.2.6 OTHER GUIDES

Other acceptable guides and publications may be referenced in specific chapters. Publications referenced in this *Manual* are available for use by each Division office, as appropriate.

1.2.7 REFERENCES

The publications listed in this section provided much of the fundamental source information used in the development of this *Manual*. Additional reference documents may also be identified in individual chapters. Where possible, an electronic link is provided for each reference cited:

1. [Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, \(FP-XX\)](#), DOT, FHWA. Current Edition.
2. [Park Road Standards](#), US Department of the Interior, National Park Service, 1984.
3. [Standard Highway Alphabet](#), DOT, FHWA, Current Edition.
4. [Standard Highway Signs](#), DOT, FHWA. Current Edition.
5. *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)*, DOT, FHWA. Current Edition
6. *A Policy on Geometric Design of Highways and Streets (Green Book)*, AASHTO. Current Edition.
7. *Roadside Design Guide*, AASHTO. Current Edition.
8. [Designing Safer Roads, Practices for Resurfacing, Restoration and Rehabilitation, Special Report 214](#), TRB, 1987.
9. *Materials Manual*, Parts I and II, AASHTO, Current Edition.
10. *AASHTO Highway Drainage Guidelines*, Current Edition.
11. *AASHTO Model Drainage Manual*, Current Edition.
12. [Government Printing Office Style Manual](#).

1.3 LAND MANAGEMENT AGENCIES

Land management agencies are Federal agencies established under laws and regulations and delegated the authority to administer and manage the vast national resources on federally owned or controlled lands within the United States and its territories. They have the responsibility for constructing and maintaining a public roads system within these lands.

The four principal land management agencies involved with the Federal Lands Highway Programs (FLHP) are as follows:

- National Park Service (NPS),
- Forest Service (FS),
- Bureau of Indian Affairs (BIA), and
- US Fish and Wildlife Service (USFWS).

FLH also works, on a smaller scale, with other Federal and State government agencies upon request.

FLH's mission when working with these land management agencies usually entails all phases of project development and design. The legal authorization permitting FLH to design and construct highways serving Federal lands is contained in 23 [USC](#) 202, 204 and 308.

1.3.1 NATIONAL PARK SERVICE (NPS)

The NPS is an agency of the US Department of Interior responsible for presiding over all national parklands, recreational areas, monuments, military parks, historical sites, seashores, lakeshores and parkways.

The national park system encompasses more than 8.7 million ha (21.5 million ac) of Federal lands that are noted for their scenic beauty or historical significance. The system contains some 13,000 km (8078 mi) of park roads and parkways.

Under the authority prescribed in 23 [USC](#) 202, 204, 308 and in the Memorandum of Agreement between the NPS and the FHWA, the procedures are established defining responsibilities of each organization relative to the project development and construction of park roads and parkways. See [FAPG](#) G6090.13.

1.3.2 FOREST SERVICE (FS)

The FS is an agency of the US Department of Agriculture whose primary responsibility is the protection and multiple use management of land and resources within the National Forest System as set forth in the *National Forest Management Act* of 1976 (16 [USC](#) 1609).

The National Forest system contains approximately 39,000 km (24,238 mi) of Forest Highways and 500,000 km (310,694 mi) of Forest Development Roads (FDR) with some 48,000 km (29,827 mi) of these FDR's maintained for public passenger car use. Under the authority prescribed in 23 [CFR](#) 660 and in the Memorandum of Understanding executed between the FS

and the FHWA, the procedures are established for coordinating project development applicable to Public Lands Highways.

Title 23 [USC](#) 308 establishes the foundation for FHWA's participation in the location, design and/or construction of forest development roads and trails when such activities are requested by the Forest Service.

1.3.3 BUREAU OF INDIAN AFFAIRS (BIA)

The BIA is an agency of the US Department of the Interior with the primary responsibility for constructing and maintaining a system of public roads located within or providing access to an Indian reservation, Indian trust land or restricted Indian land, which is not subject to fee title alienation without the approval of the Federal Government. The system includes approximately 39,000 km (24,234 mi) of roads.

Under the authority prescribed in Title 23 [USC](#) 204, 308 and in the Memorandum of Agreement between the BIA and FHWA, the Federal Lands Highway Divisions may perform any or all phases of project development as set forth in individual project agreements executed between BIA and the appropriate division. See [FAPG](#) G6090.17.

1.3.4 US FISH AND WILDLIFE SERVICE (USFWS) [REFUGE ROADS](#)

USFWS is an agency in the US Department of Interior. The National Wildlife Refuge System comprises over 38 million ha (95 million ac), with more than 535 refuges and thousands of small prairie wetlands that serve as waterfowl breeding and nesting areas.

[Refuge Roads](#) are public roads that provide access to or within a unit of the National Wildlife Refuge System and ownership and maintenance responsibility are the Federal government's. In order to be considered Public Roads, [Refuge Roads](#) must be opened to the general public during substantial parts of the year.

[Refuge Road](#) funds may only be used for resurfacing, restoration and rehabilitation (RRR) to extend the service life of an existing road and enhance safety. RRR work includes the placement of additional surfacing materials and/or other work necessary to return an existing roadway including shoulders, the roadside and appurtenances, to a condition of structural adequacy. Construction of new roads is not authorized. [Refuge Road](#) projects generally will not involve widening beyond the existing road bench or require the construction of new retaining walls or cuts and fills. Exceptions where work could occur off of the road bench include work on drainage structures, existing retaining walls, slope failures, bridges and spot traffic safety improvement work. Eligible structural work includes approach fill rehabilitation, superstructure replacements, abutment and foundation repairs, abutment slope protection, foundation scour repair and protection work and piling replacements. Small bridges or large box culverts may be replaced if the estimated cost for a replacement structure is \$500,000 or less.

Because the RRR program improvements are required to stay within the existing roadway prism, design standards for new construction and re-construction are typically not applicable. Since USFWS has not developed RRR design criteria, the AASHTO design criteria is the basis for preparation of design exceptions where traffic safety experience does not warrant

improvements to full design criteria. Achievement of AASHTO design criteria usually will not be possible without demonstrated and documented safety deficiencies.

1.3.5 OTHER AGENCIES

In addition to the primary land management agencies, FLH, when requested, cooperates and works with other Federal agencies (e.g., Department of Defense, Bureau of Land Management, Federal Aviation Administration, Metropolitan Washington Airports Authority, Federal Railroad Administration, Corps of Engineers, Bonneville Power Administration, Immigration and Naturalization Service).

FLH also provides assistance to State and local agencies as well as to the FHWA-owned Turner Fairbank Highway Research facility in McLean, Virginia on an as-requested basis.